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(54) Title: IMPROVED CONFIGURATION AND PROCESS FOR SHIFT CONVERSION

Diagram illustrating a two-reactor synthesis gas conversion system. The process starts with **Syn Gas** entering **Shift Reactor 1** (101). A **40% of Total Flow** line (130) goes to a **Steam** preheat coil (140) before entering reactor 101. A **60% By-pass** line (102'') goes to **Shift Reactor 2** (120). The effluent from reactor 101 goes to an **Effluent Cooler** (150), then to reactor 120. The effluent from reactor 120 is sent to a **Control Conversion** unit (122). A feedback line (100) goes from the control conversion unit back to reactor 101.

By-pass to Control Conversion
(0% at design, 0% used for comparison purposes)

(57) Abstract: The inventors discovered that a significant portion of steam in hydrogen production from syngas (and other gases with relatively high CO to H₂ ratio) is utilized for temperature control in the shift reactors. Therefore, it is contemplated that the overall steam demand can be significantly lowered by splitting the feed stream in a first and second portion, wherein the first portion is fed to a first shift reactor to form a product that is then combined with the second portion prior to entering a second shift reactor.



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